

REMARKS

This Amendment is filed in response to the Office Action dated October 16, 2003, which has a shortened statutory period set to expire January 16, 2004.

Applicants have amended Claims 25-55 to correct for a numbering error (now renumbered Claims 24-54). Based on this renumbering, Applicants request reconsideration and withdrawal of the objection to the claims.

Applicants respectfully traverse the rejection of Claims 1-10, 12-32, 34-36, and 44-54 as being anticipated by Agrawal. Agrawal teaches layout processing to an IC layout using a shape-based identification system. Col. 3, lines 19-22. A library of layout processing actions associated with the shapes can be rule-based, model-based, or can provide any other response a user would like implemented (i.e. "layout processing" can include OPC, phase shift mask (PSM), design rule checking (DRC), "fracturing" of layout features for e-beam mask making machines etc.). Col. 3, line 63 to col. 4, line 1.

Notably, Agrawal fails to teach layout beautification. More specifically, Agrawal fails to disclose or suggest a "layout imperfection" as recited in Claims 1 and 12. As taught by Applicants in paragraph 4, layout imperfections can significantly increase data volume for a particular IC layout, thereby undesirably increasing layout processing (e.g. OPC, DRC, etc.) and mask production times. Applicants respectfully traverse the characterizations of Agrawal in the Office Action as teaching a layout imperfection.

For example, col. 4, lines 18-27 teach that shape matching can be performed in any number of sequences. For example, shape matching can be performed in order of decreasing shape complexity, in order of increasing shape complexity, or in a

user-desired order. Therefore, col. 4, lines 18-27 fails to teach a layout imperfection.

Figs. 4a-4c illustrate various sample shapes in a shape-based rule library. Col. 5, lines 7-8. Therefore, these figures teach nothing regarding a layout imperfection.

Table 2, provided in col. 6, lines 25-34, lists various exemplary shape properties that can define the edges of each individual shape. Col. 6, lines 14-24. Thus, Table 2 fails to teach layout imperfections.

Col. 8, lines 49-61 teach that a layout modification system includes a bias table capturing a set of actions based on a catalog of shapes. The shapes/actions may be provided as defaults by the system, or the user may add or modify shapes/actions as desired. In one embodiment, a GUI allows a user to define PSM and OPC actions to be applied upon detection of particular shapes. Thus, col. 8, lines 49-59 fails to teach a layout imperfection.

Col. 10, lines 37-47 teach that if a sequential action operation is being performed (after the first shape is compared), then the action associated with the first shape is applied to the matching layout features. A second shape can then be selected from the shape catalog. After a second match operation, the action associated with the second shape can be applied to the layout geometry. Therefore, col. 10, lines 37-47 fails to teach layout imperfections.

Col. 10, line 60 to col. 11, line 20 teach a possible outcome of an action conflict originating in a shape conflict. Specifically, the cross-like shape of feature F3' in Fig. 9c is produced as the serifs from action A physically overlap with the extended region generated by action B. Therefore, in some embodiments, conflict resolution logic can be included. Col.

10, lines 21-23. Neither the conflicts nor the conflict resolutions teach anything regarding layout imperfections.

Col. 14, lines 20-31 teach that a definition of first shape can be accessed. The first shape includes first and second edges coupled in accordance with certain properties. A first action can be accessed, wherein the first action is based on a first portion of a first plurality of properties. The first action specifies the application of a first layout modification. A first set of layout features with the first shape and the first portion of the first plurality of properties can then be matched. At this point, the first action can be applied to the first set of layout features. Thus, col. 14, lines 20-31 fails to teach a layout imperfection.

Because Agrawal fails to disclose or suggest layout imperfections, Applicants request reconsideration and withdrawal of the rejection of Claims 1 and 12. Claims 2-11 depend from Claim 1 and therefore are patentable for at least the reasons presented above for Claim 1. Based on those reasons, Applicants also request reconsideration and withdrawal of the rejection of Claims 2-11. Claims 13-18 depend from Claim 12 and therefore are patentable for at least the reasons presented above for Claim 12. Based on those reasons, Applicants also request reconsideration and withdrawal of the rejection of Claims 13-18.

Claim 19 recites a layout beautification engine. As taught by Applicants, layout beautification includes detecting and correcting layout imperfections. Specification, paragraph 0006. Applicants submit that Agrawal fails to disclose or suggest a layout beautification engine. Applicants respectfully traverse the characterization in the Office Action that Agrawal teaches this limitation. Specifically, col. 12, lines 49-60 teach that an OPC engine can receive a set of geometries and performs shape matching as well as action application to the set. An OPC

engine performs a different function than a layout beautification engine. Therefore, col. 12, lines 49-60 fail to disclose or suggest a layout beautification engine. For the above reasons, Applicants request reconsideration and withdrawal of the rejection of Claim 19.

Claims 20-25 (as renumbered) depend from Claim 19 and therefore are patentable for at least the reasons presented above for Claim 12. Based on those reasons, Applicants also request reconsideration and withdrawal of the rejection of Claims 20-25.

Claim 26 (as renumbered) recites a system for performing layout beautification on an IC layout data file. Therefore, Claim 26 is patentable for substantially the reasons presented above for Claim 19. Based on those reasons, Applicants also request reconsideration and withdrawal of the rejection of Claim 26.

Claims 27-31 (as renumbered) depend from Claim 26 and therefore are patentable for at least the reasons presented above for Claim 26. Based on those reasons, Applicants also request reconsideration and withdrawal of the rejection of Claims 27-31.

Claim 32 (as renumbered) recites a software program for performing layout beautification on a plurality of polygons in an IC layout. This software program includes a second set of instructions for performing a first layout beautification action on each of the first set of matching layout features. Therefore, Claim 32 is patentable for substantially the reasons presented above for Claim 19. Based on those reasons, Applicants also request reconsideration and withdrawal of the rejection of Claim 32.

Claims 33-39 (as renumbered) depend from Claim 32 and therefore are patentable for at least the reasons presented

above for Claim 32. Based on those reasons, Applicants also request reconsideration and withdrawal of the rejection of Claims 33-43.

Claim 44 (as renumbered) recites an apparatus for reducing output data size in an input layout by beautifying the input layout. Therefore, Claim 44 is patentable for substantially the reasons presented above for Claim 19. Based on those reasons, Applicants also request reconsideration and withdrawal of the rejection of Claim 44.

Applicants respectfully traverse the characterization of Agrawal as beautifying the input layout. Specifically, col. 12, line 21 teaches that an OPC system can include input and output data managers. Col. 12, lines 41-48 teach that a hierarchy manager organizes and categorizes the sets of geometries according to a predefined ordering basis (e.g. to minimize the amount of data required to be processed or to minimize the time required for processing). The hierarchy manager then feeds the sets of geometries to an OPC engine according to its priority structure. Neither of these cited sections disclose or suggest beautifying the input layout.

Claim 45 (as renumbered) depends from Claim 44 and therefore is patentable for at least the reasons presented above for Claim 44. Based on those reasons, Applicants also request reconsideration and withdrawal of the rejection of Claim 45.

Claim 46 (as amended and renumbered) recites modifying the layout according to corrective actions associated with the identified shape patterns, thereby removing at least one layout imperfection. Therefore, Claim 46 is patentable for substantially the same reasons as presented for Claims 1 and 12.

Claims 47-50 (as renumbered) depend from Claim 46 and therefore are patentable for at least the reasons presented above for Claim 46. Based on those reasons, Applicants also

request reconsideration and withdrawal of the rejection of Claims 47-50.

Claim 51 (as renumbered) recites a shape-based beautification method in a layout. Therefore, Claim 51 is patentable for substantially the reasons presented above for Claim 19. Moreover, this method applies at least one correction to an identified shape pattern, thereby removing at least one layout imperfection and reducing fracturing data volume in the layout. Therefore, Claim 51 is further patentable for substantially the reasons presented above for Claims 1 and 12. Based on all of the above reasons, Applicants request reconsideration and withdrawal of the rejection of Claim 51.

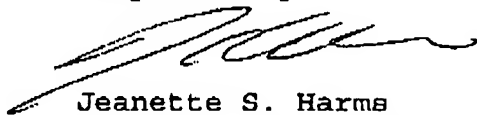
Claims 52-54 (as renumbered) depend from Claim 51 and therefore are patentable for at least the reasons presented above for Claim 51. Based on those reasons, Applicants also request reconsideration and withdrawal of the rejection of Claims 52-54.

CONCLUSION

Claims 1-54 are pending in the present application.
Applicants request allowance of these claims.

If there are any questions, please telephone the undersigned at 408-451-5907 to expedite prosecution of this case.

Respectfully submitted,



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CERTIFICATE OF TRANSMISSION (37 C.F.R. 1.8(a))

I hereby certify that, on the date shown below, this correspondence is being transmitted by facsimile to the Patent and Trademark Office.

Date: 1/5/2004 Signature: Richard A. Brumaker